CONSERVATION STRATEGIES FOR TAGASASTE AND ESCOBÓN (*Chamaecytisus proliferus* (L. fil.) Link) IN THE CANARY ISLANDS

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INTRODUCTION

Chamaecytisus proliferus forms a taxonomic complex in the Canary Islands. Forms of this complex group have a high value as fodder trees. Plants from the island of La Palma are known as *tagasaste* and have achieved importance in agriculture elsewhere, particularly in Australia and New Zealand. Plants from the rest of the archipelago are known as *escobón* and although they are not cultivated, they are pruned in their wild habitats by farmers and fed to cattle.

Besides its obvious importance as an endemic species of the Canary Islands flora, the conservation of *C. proliferus* should also be regarded from a genetic point of view, due to the importance of this species for agriculture. A basic concept of plant genetic resources is the conservation of an adequate spectrum of genetic variation, which can be achieved in two ways: *in situ* and *ex situ* conservation. *Ex situ* genetic conservation is achieved in seed banks, field gene banks, *in vitro* storage, botanical gardens and arboreta. *In situ* genetic conservation is the conservation of populations in the environments where they are found, and comprises ecosystem preservation, nature reserves and genetic reserves. In both strategies, the important feature is the maintenance of the genetic integrity of the species or populations.

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In this paper different strategies for the genetic conservation of *C. proliferus* in the Canary Islands will be presented and the importance of ecogeographical studies (IBPGR, 1985) in establishing the criteria for *in situ* and *ex situ* conservation of *Chamaecytisus* germplasm, and other endemics from the Canary Islands, will be stressed.

Table 1. Association of the morphological forms of *Chamaecytisus proliferus* with different ecosystems in the Canary Islands

COMMON NAME	ISLAND	ECOSYSTEM
White escobón of Tenerife	Tenerife	Laurel wood and heath belt
White escobón of Gran Canaria	Gran Canaria	Laurel wood and heath belt zones
Tagasaste	La Palma	Laurel wood and heath belt zones
White tagasaste	La Palma	Pine forest and high altitude scrub
Escobón of El Hierro	El Hierro	Heath belt zone
Narrow-leaved escobón	Tenerife	Pine forest, high altitude scrub and lower shrubland
	La Gomera	Lower shrubland and transition towards south facing heath belt
Escobón of southern Gran Canaria	Gran Canaria	Pine forest and lower shrubland

In situ CONSERVATION

In theory, the network of National Parks, UNESCO Biosphere Reserves and Reservas Naturales, Parques Naturales and Parajes Naturales should accomplish the aims of *in situ* conservation of *C. proliferus* in the Canary Islands. These wild reserves have been aimed at the preservation of the most endangered and representative ecosystems in the archipelago. Based on ecogeographical and morphological studies (Francisco-Ortega *et al.*, 1990), it is apparent that seven morphological types comprise this complex, which are associated with major ecosystems in the archipelago (Table 1), particularly the laurel wood (laurisilva), heath belt (fayal-brezal) and pine forest. Since the distribution of tagasaste and escobón is clearly related with these ecosystems, representative populations of all the morphological types of this group are found

within this framework of wild reserves. Consequently even the rarest morphological types from the complex, namely escobón of El Hierro and Tenerife white escobón are apparently conserved in their wild habitats.

It is clear however that in all the populations conserved within this network, the majority of plants are either grazed by goats or pruned by farmers as sources of fodder for cattle. The fact that both escobón and tagasaste are plants that can withstand continuous pruning has meant that they have not vanished from the wild. The main effect that this wide utilization has had in many of these ecosystems is that *C. proliferus* has apparently become a less aggressive plant, and other species with similar ecological requirements have been able to become established in association with either tagasaste or escobón.

In order to have a better management of important populations, the present conservation status of these reserves should not be changed, and excessive grazing and pruning of tagasaste and escobón trees or shrubs should be controlled. Overgrazing might cause them to become endangered, as seems to be happening to important populations of tagasaste in northern La Palma.

Therefore the strategies for *in situ* genetic conservation which have been outlined here are based on the relationship between conservation and management, and that this management should have a rather pragmatic approach. There must be some compromises between the traditional utilization of escobón and tagasaste carried out by the small farmers from the islands and the conservation of the threatened Canarian ecosystems. Only by means of establishing criteria of utilization for *C. proliferus* within each reserve will it be possible to achieve both objectives of conservation and utilization.

Genetic conservation *in situ* within these reserves is also the most appropriate method for permitting continued evolution of the *C. proliferus* complex, since such conservation is dynamic (Guldager, 1975). However it is not possible to conserve all the genetic variation of *C. proliferus in situ*, since populations of tagasaste and escobón are spread throughout much of the islands, and to conserve them would require establishment of extensive and continuous nature reserves where the different morphological types exist. Therefore for those populations which are not located within the network of the Canarian nature reserves it is necessary to employ another strategy for the preservation of the genetic variation of these populations through *ex situ* conservation.

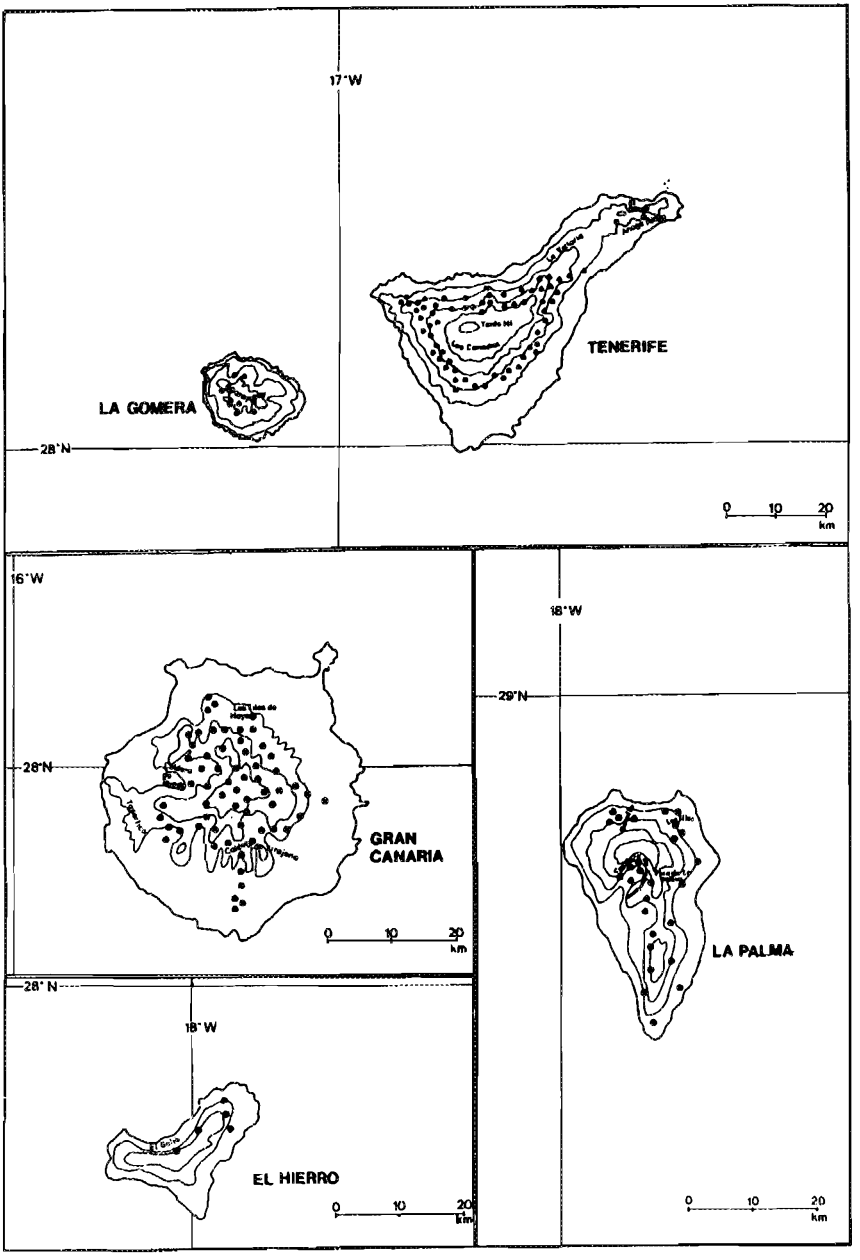

Figure 1. Collecting sites for tagasaste and escobón in the Canary Islands

Ex situ CONSERVATION

Ex situ conservation is static conservation (Guldager, 1975), and for many species it is achieved by storage of seeds at low temperature and moisture content in a seed bank. Genetic conservation in a seed bank is aimed at maintaining the genetic integrity of plant populations through seed samples. As with other legumes of Mediterranean origin, *C. proliferus* has orthodox seeds that can withstand drying and low temperature storage.

Germplasm sampling for *ex situ* conservation of *C. proliferus* should follow the patterns of ecogeographical variation found within the whole complex, as locally frequent alleles with adaptive value are more likely to be found in each one of the different ecosystems where the different morphological types are formed.

In 1989 germplasm collection of tagasaste and escobón in the Canary Islands was sponsored primarily by the International Board for Plant Genetic Resources. It was carried out following the climatological and geographical gradients found within each island. It is conceivable therefore, that having used this ecogeographical diversity as a basis for germplasm collection, alleles which have adaptive value were also sampled. Seeds were collected from over 190 wild, semi-cultivated and cultivated populations (Figure 1). Using this procedure, both within and between island variation were sampled.

Seeds from all these populations are conserved at the Centro Nacional de Recursos Fitogenéticos (Alcalá de Henares, Spain), with duplicate collections maintained at the Centro de Investigaciones Tecnológicas y Agrarias, Tenerife, and the University of Birmingham. It is important that future studies determine optimum conditions for maximum seed viability, particularly at ultra-low moisture content, and the importance of imbibition damage during germination.

CONCLUSIONS

For the application of the conservation strategies suggested in this paper to other endemic species in the Canary Islands, it is important that studies of ecogeographical variation are made prior to undertaking any project on their genetic conservation. We suggest that the first steps needed for the collection and conservation of plant genetic resources can be based on the extensive climatological and geographical surveys accomplished in the Canary Islands during the last twenty years (e.g. Anon., 1975, 1989; Kunkel, 1978; Afonso-Perez, 1980, 1985).

Following this strategy it will be possible to relate future laboratory work and field observations with the patterns of climatological and geographical variation reported in the literature. The main conclusion that arises from the study of variation in *C. proliferus* is that genetic conservation of endemic species in the Canary Islands cannot be based on just a few populations, since there is considerable ecological variation both between and within islands which is likely to be correlated with genetic diversity. The study of ecogeographical variation in *C. proliferus* and conservation strategies for this species should serve as a model for *in situ* and *ex situ* conservation of other endemic species from the Canary Islands in the future.

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